

SEQUENCE LISTING

(1) GENERAL INFORMATION:

- (i) APPLICANT: Administrators of Tulane Educational Fund
Philipp, Mario T.
- (ii) TITLE OF INVENTION: Surface Antigens and Proteins Useful in
Compositions for the Diagnosis and Prevention of Lyme
Disease
- (iii) NUMBER OF SEQUENCES: 14
- (iv) CORRESPONDENCE ADDRESS:
 - (A) ADDRESSEE: Howson and Howson
 - (B) STREET: Spring House Corporate Cntr., P.O. Box 457
 - (C) CITY: Spring House
 - (D) STATE: Pennsylvania
 - (E) COUNTRY: USA
 - (F) ZIP: 19477
- (v) COMPUTER READABLE FORM:
 - (A) MEDIUM TYPE: Floppy disk
 - (B) COMPUTER: IBM PC compatible
 - (C) OPERATING SYSTEM: PC-DOS/MS-DOS
 - (D) SOFTWARE: PatentIn Release #1.0, Version #1.30
- (vi) CURRENT APPLICATION DATA:
 - (A) APPLICATION NUMBER: WO
 - (B) FILING DATE:
 - (C) CLASSIFICATION:
- (vii) PRIOR APPLICATION DATA:
 - (A) APPLICATION NUMBER: US 60/051,271
 - (B) FILING DATE: 30-JUN-1997
- (viii) ATTORNEY/AGENT INFORMATION:
 - (A) NAME: Bak, Mary E.
 - (B) REGISTRATION NUMBER: 31,215
 - (C) REFERENCE/DOCKET NUMBER: TUL2APCT
- (ix) TELECOMMUNICATION INFORMATION:
 - (A) TELEPHONE: 215-540-9200
 - (B) TELEFAX: 215-540-5818

(2) INFORMATION FOR SEQ ID NO:1:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 1047 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: double
 - (D) TOPOLOGY: unknown
- (ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 1..1047

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

AAG Lys 1	AAT Asn	AAT Asn	GAT Asp	CAT His 5	GAT Asp	AAT Asn	CAT His	AAG Lys	GGG Gly 10	ACT Thr	GTT Val	AAG Lys	AAT Asn	GCT Ala 15	GTT Val	48
GAT Asp	ATG Met	GCA Ala	AAG Lys 20	GCC Ala	GCT Ala	GAG Glu	GAA Glu	GCT Ala	GCA Ala	AGT Ser	GCT Ala	GCA Ala	AGT Ser 30	GCT Ala	GCT Ala	96
ACT Thr	GGT Gly 35	AAT Asn	GCA Ala	GCG Ala	ATT Ile	GGG Gly 40	GAT Asp	GTT Val	GTT Val	AAG Lys	AAT Asn	AGT Ser 45	GGG Gly	GCA Ala	GCA Ala	144
GCA Ala 50	AAA Lys	GGT Gly	GGT Gly	GAG Glu	GCG Ala	GCG Ala	AGT Ser 55	GTT Val	AAT Asn	GGG Gly 60	ATT Ile	GCT Ala	AAG Lys	GGG Gly	ATA Ile	192
AAG Lys 65	GGG Gly	ATT Ile	GTT Val	GAT Asp 70	GCT Ala	GCT Ala	GGA Gly	AAG Lys	GCT Ala	GAT Asp 75	GCG Ala	AAG Lys	GAA Glu	GGG Gly	AAG Lys 80	240
TTG Leu	GAT Asp	GCT Ala	ACT Thr	GGT Gly 85	GCT Ala	GAG Glu	GGT Gly	ACG Thr	ACT Thr	AAC Asn	GTG Val	AAT Asn	GCT Ala	GGG Gly 95	AAG Lys	288
TTG Leu	TTT Phe	GTG Val	AAG Lys 100	AGG Arg	GCG Ala	GCT Ala	GAT Asp	GAT Asp 105	GGT Gly	GGT Gly	GAT Asp	GCA Ala	GAT Asp 110	GAT Asp	GCT Ala	336
GGG Gly 115	AAG Lys	GCT Ala	GCT Ala	GCT Ala	GCG Ala	GTT Val	GCT Ala	GCA Ala	AGT Ser	GCT Ala	GCT Ala	ACT Thr	GGT Gly	AAT Asn	GCA Ala	384
GCG Ala 130	ATT Ile	GGA Gly	GAT Asp	GTT Val	GTT Val	AAT Asn	GGT Gly	GAT Asp	GTG Val	GCA Ala	AAA Lys	GCA Ala	AAA Lys	GGT Gly	GGT Gly	432
GAT Asp 145	GCG Ala	GCG Ala	AGT Ser	GTT Val	AAT Asn 150	GGG Gly	ATT Ile	GCT Ala	AAG Lys	GGT Gly 155	ATA Ile	AAG Lys	GGG Gly	ATT Ile	GTT Val 160	480
GAT Asp	GCT Ala	GCT Ala	GAG Glu	AAG Lys 165	GCT Ala	GAT Asp	GCG Ala	AAG Lys	GAA Glu	GGG Gly	AAG Lys	TTG Leu	AAT Asn	GCT Ala	GCT Ala	528
GGT Gly	GCT Ala	GAG Glu	GGT Gly	ACG Thr 180	ACT Thr	AAC Asn	GCG Ala	GAT Asp 185	GCT Ala	GGG Gly	AAG Lys	TTG Leu	TTT Phe	GTG Val	AAG Lys	576
AAT Asn	GCT Ala	GGT Gly	AAT Asn	GTG Val	GGT Gly	GGT Gly	GAA Glu 200	GCA Ala	GGT Gly	GAT Asp	GCT Ala	GGG Gly	AAG Lys	GCT Ala	GCT Ala	624

GCT GCG GTT GCT GCT GTT AGT GGG GAG CAG ATA TTA AAA GCG ATT GTT Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val 210 215 220	672
CAT GCT GCT AAG GAT GGT GGT GAG AAG CAG GGT AAG AAG GCT GCG GAT His Ala Ala Lys Asp Gly Gly Glu Lys Gln Gly Lys Lys Ala Ala Asp 225 230 235 240	720
CGT ACA AAT CCC ATT GAC GCG GCT ATT GGG GGT GCG GGT GAT AAT GAT Arg Thr Asn Pro Ile Asp Ala Ala Ile Gly Gly Ala Gly Asp Asn Asp 245 250 255	768
GCT GCT GCG GCG TTT GCT ACT ATG AAG AAG GAT GAT CAG ATT GCT GCT Ala Ala Ala Ala Phe Ala Thr Met Lys Lys Asp Asp Gln Ile Ala Ala 260 265 270	816
GCT ATG GTT CTG AGG GGA ATG GCT AAG GAT GGG CAA TTT GCT TTG AAG Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln Phe Ala Leu Lys 275 280 285	864
GAT GCT GCT GCT GCT CAT GAA GGG ACT GTT AAG AAT GCT GTT GAT ATA Asp Ala Ala Ala Ala His Glu Gly Thr Val Lys Asn Ala Val Asp Ile 290 295 300	912
ATA AAG GCT GCT GCG GAA GCT GCA AGT GCT GCA AGT GCT GCT ACT GGT Ile Lys Ala Ala Ala Glu Ala Ala Ser Ala Ala Ser Ala Ala Thr Gly 305 310 315 320	960
AGT GCA GCA ATT GGG GAT GTT GTT AAT GGT AAT GGA GCA ACA GCA AAA Ser Ala Ala Ile Gly Asp Val Val Asn Gly Asn Gly Ala Thr Ala Lys 325 330 335	1008
GGT GGT GAT GCG AAG AGT GTT AAT GGC ATT GCT AAG GGA Gly Gly Asp Ala Lys Ser Val Asn Gly Ile Ala Lys Gly 340 345	1047

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 349 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

Lys Asn Asn Asp His Asp Asn His Lys Gly Thr Val Lys Asn Ala Val 1 5 10 15
Asp Met Ala Lys Ala Ala Glu Glu Ala Ala Ser Ala Ala Ser Ala Ala 20 25 30
Thr Gly Asn Ala Ala Ile Gly Asp Val Val Lys Asn Ser Gly Ala Ala 35 40 45

Ala Lys Gly Gly Glu Ala Ala Ser Val Asn Gly Ile Ala Lys Gly Ile
 50 55 60
 Lys Gly Ile Val Asp Ala Ala Gly Lys Ala Asp Ala Lys Glu Gly Lys
 65 70 75 80
 Leu Asp Ala Thr Gly Ala Glu Gly Thr Thr Asn Val Asn Ala Gly Lys
 85 90 95
 Leu Phe Val Lys Arg Ala Ala Asp Asp Gly Gly Asp Ala Asp Asp Ala
 100 105 110
 Gly Lys Ala Ala Ala Ala Val Ala Ala Ser Ala Ala Thr Gly Asn Ala
 115 120 125
 Ala Ile Gly Asp Val Val Asn Gly Asp Val Ala Lys Ala Lys Gly Gly
 130 135 140
 Asp Ala Ala Ser Val Asn Gly Ile Ala Lys Gly Ile Lys Gly Ile Val
 145 150 155 160
 Asp Ala Ala Glu Lys Ala Asp Ala Lys Glu Gly Lys Leu Asn Ala Ala
 165 170 175
 Gly Ala Glu Gly Thr Thr Asn Ala Asp Ala Gly Lys Leu Phe Val Lys
 180 185 190
 Asn Ala Gly Asn Val Gly Gly Glu Ala Gly Asp Ala Gly Lys Ala Ala
 195 200 205
 Ala Ala Val Ala Ala Val Ser Gly Glu Gln Ile Leu Lys Ala Ile Val
 210 215 220
 His Ala Ala Lys Asp Gly Gly Glu Lys Gln Gly Lys Lys Ala Ala Asp
 225 230 235 240
 Arg Thr Asn Pro Ile Asp Ala Ala Ile Gly Gly Ala Gly Asp Asn Asp
 245 250 255
 Ala Ala Ala Ala Phe Ala Thr Met Lys Lys Asp Asp Gln Ile Ala Ala
 260 265 270
 Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln Phe Ala Leu Lys
 275 280 285
 Asp Ala Ala Ala Ala His Glu Gly Thr Val Lys Asn Ala Val Asp Ile
 290 295 300
 Ile Lys Ala Ala Ala Glu Ala Ala Ser Ala Ala Ser Ala Ala Thr Gly
 305 310 315 320
 Ser Ala Ala Ile Gly Asp Val Val Asn Gly Asn Gly Ala Thr Ala Lys
 325 330 335
 Gly Gly Asp Ala Lys Ser Val Asn Gly Ile Ala Lys Gly
 340 345

(2) INFORMATION FOR SEQ ID NO:3:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 283 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: double
 - (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

GCCGCTGGAT GGTGGTGAGA AGCAGGGTAA GAAGGCTGCG GATCGTACAA ATCCCATTGA	60
CGCGGCTATT GGGGGTGCGG GTGATAATGA TGCTGCTGCG GCGTTTGCTA CTATGAAGAA	120
GGATGATCAG ATTGCTGCTG CTATGGTTCT GAGGGGAATG GCTAAGGATG GGCAATTTGC	180
TTTGAAGGAT GCTGCTGCTG CTCATGAAGG GACTGTTAAG AATGCTGTTG ATATAATAAA	240
GGCTGCTGCG GAAGCTGCAA GTGCTGCAAG TGCTGCTACT GGT	283

(2) INFORMATION FOR SEQ ID NO:4:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 233 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: double
 - (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

TTTATTATAT CAACAGATTC TTAACAGTCC CTTCATGAGC AGCAGCAGCA TCCTTCAAAG	60
CAAATTGCCC ATCCTTAGCC ATTCCCCTCA GAACCATAGC AGCAGCAATC TGATCATCCT	120
TCTTCATAGT AGCAAACGCC GCAGCAGCAT CATTATCACC CGCACCCCCA ATAGCCGCGT	180
CAATCGGATT TGTACGATCC GCAGCCTTCT TACCCTGCTT CTCACCACCA TCC	233

(2) INFORMATION FOR SEQ ID NO:5:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 194 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: double
 - (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

CCGTGCAAGC TGGGTGAAG AAGGTTGGGG ATGTTGTTAA GAATAGTGAG GCAAAAGATG	60
GTGATGCGGC GAGTGTTAAT GGGATTGCTA AGGGGATAAA GGGGATTGTT GATGCTGCTG	120
AGAAGGCTGA TGCGAAGGAA GGGAAGTTGG TATGTGGCTG GTGCTGCTGG TGAAACTAAC	180
AAGGAAGCGG CCGC	194

(2) INFORMATION FOR SEQ ID NO:6:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 369 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: double
 - (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

GCGGCCGCTT GAGGAAGCTG CAAGTGCTGC AAGTGCTGCT ACTGGTAATG CAGCGATTGG	60
GGATGTTGTT AAGAATAGTG GGGCAGCAGC AAAAGGTGGT GAGGCGGCGA GTGTTAATGG	120
GATTGCTAAG GGGATAAAGG GGATTGTTGA TGCTGCTGGA AAGGCTGATG CGAAGGAAGG	180
GAAGTTGGAT GCTACTGGTG CTGAGGGTAC GACTAACGTG AATGCTGGGA AGTTGTTTGT	240
GAAGAGGGCG GCTGATGATG GTGGTGATGC AGATGATGCT GGAAGGCTG CTGCTGCGGT	300
TGCTGCAAGT GCTGCTACTG GTAATGCAGC GATTGGAGAT GTTGTTAATG GTGATGTGGC	360
AAAACAAAA	369

(2) INFORMATION FOR SEQ ID NO:7:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 142 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: double
 - (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

AAGGATGGTG ATGATAAGCA GGGTAAGAAG GCTGAGGATG CTACAAATCC GATTGACGCG	60
GCTATTGGGG GTGCAGGTGC GGGTGCTAAT GCTGCTGCGG CGTTTAATAA TATGAAGAAG	120
GATGATCAGA TTGAGCGGCC GC	142

(2) INFORMATION FOR SEQ ID NO:8:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 210 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: double
 (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

GGTGAAACTA ACAAGGATGC TGGGAAGTTG TTTGTGAAGA AGAATGGTGA TGATGGTGGT	60
GATGCAGGTG ATGCTGGGAA GGCTGCTGCT GCGGTTGCTG CTGTTAGTGG GGAGCAGATA	120
TTAAAAGCGA TTGTTGATGC TGCTAAAGAT GGTGATAAGA CGGGGGTTAC TGATGTAAAG	180
GATGCTACAA ATCCGATTGA CGCGGCTATT	210

(2) INFORMATION FOR SEQ ID NO:9:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 236 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: double
 (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

TATATAATAA AGGCTGCTGC GAAGCTGCAA GTGCTGCAAG TGCTGCTACT GGTAGTGCAG	60
CAATTGGGGA TGTTGTTAAT GGTAATGGAG CAACAGCAAA AGGTGGTGAT GCGAAGTGTT	120
AATGGGATTG CTAAGGGGAT AAAGGGGATT GTTGATGCTG CTGAGAAGGC TGATGCGAAG	180
GAAGGGAAGT TGGATGTGGC TGGTGATGCT GGTGAACTA ACAAGGAAGC GGCCGC	236

(2) INFORMATION FOR SEQ ID NO:10:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 199 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: double
 (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

ATGAGAGGAT CTCATCACCA TCACCATCAC ACGGATCCCC CGGGCTGCAG GAATTCGCGG	60
CCGCTGAAGG CTGATGCGAA GGAAGGGAAG TTGGATGTGG CTGGTGCTGC TGGTGAAACT	120

AACAAGGATG CTGGGAAGTT GTTTGTGAAG AAGAATAATG AGGGTGGTGA AGCAAATGAT 180
GCTGGGAAGG CTGCTGCTG 199

(2) INFORMATION FOR SEQ ID NO:11:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 272 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: double
 (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

GCCGCTGGAT GATCAGATTG CTGCTGCTAT GGTGTGAGG GGAATGGCTA AGGATGGGCA 60
 GTTTGCTTTG AAGGATGATG CTGCTAAGGA TGGAGATAAA ACGGGGGTTG CTGCGGATGT 120
 GAAAATCCGA TTGACGCGGC TATTGGGGGT GCGGATGCTG ATGCTGCGGC GTTTAATAAG 180
 GAGGGGATGA AGAAGGATGA TCAGATTGCT GCTGCTATGG TTCTGAGGGG AATGGCTAAG 240
 GATGGGCAGT TTGCTTTGAC GAATAATGCT GC 272

(2) INFORMATION FOR SEQ ID NO:12:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 289 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: double
 (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

ACTGTTAAGA ATGCTGTTGA TATAATAAAG GCTGCTGCGG AAGCTGCAAG TGCTGCAAGT 60
 GCTGCTACTG GTAGTGCAGC AATTGGGGAT GTTGTTAATG GTAATGGAGC AACAGCAAAA 120
 GGTGGTGATG CGAAGAGTGT TAATGGGATT GCTAAGGGGA TAAAGGGGAT TGTTGATGCT 180
 GCTGAGAAGG CTGATGCGAA GGAAGGGAAG TTGGATGTGG CTGGTGATGC TGGTGAAACT 240
 AACAAGGATG CTGGGAAGTT GTTTGTGAAG AACAATGGTA ATGAGGGTA 289

(2) INFORMATION FOR SEQ ID NO:13:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 142 base pairs
 (B) TYPE: nucleic acid
 (C) STRANDEDNESS: double
 (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: cDNA

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 2..142

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

G CCG CTT ACA AAT CCG ATT GAC GCG GCT ATT GGG GGG AGT GCG GAT	46
Pro Leu Thr Asn Pro Ile Asp Ala Ala Ile Gly Gly Ser Ala Asp	
1 5 10 15	
CGT AAT GCT GAG GCG TTT GAT AAG ATG AAG AAG GAT GAT CAG ATT GCT	94
Arg Asn Ala Glu Ala Phe Asp Lys Met Lys Lys Asp Asp Gln Ile Ala	
20 25 30	
GCT GCT ATG GTT CTG AGG GGA ATG GCT AAG GAT GGG CAG TTT GCT TTG	142
Ala Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln Phe Ala Leu	
35 40 45	

(2) INFORMATION FOR SEQ ID NO:14:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 47 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

Pro Leu Thr Asn Pro Ile Asp Ala Ala Ile Gly Gly Ser Ala Asp Arg	
1 5 10 15	
Asn Ala Glu Ala Phe Asp Lys Met Lys Lys Asp Asp Gln Ile Ala Ala	
20 25 30	
Ala Met Val Leu Arg Gly Met Ala Lys Asp Gly Gln Phe Ala Leu	
35 40 45	